CROP EXPERIMENTS,

BOMBAY PRESIDENCY.

1886-87.

No. 2062 of 1887.

From

W. P. SYMONDS, Esquire,
Acting Director, Land Records and Agriculture, Bombay;

To

The ACTING CHIEF SECRETARY to GOVERNMENT,
Revenue Department, Bombay.

Poona, 29th October 1887.

Sir,

I have the honour to submit, through the Commissioners of Divisions, the usual Analysis of Crop Experiments carried out by Revenue officers during 1886-87.

2. The number of experiments made during 1886-87 was 62 against 31 in 1885-86, the increase being due to the orders of Government directing that in each district two ordinary experiments, each on the staple crops, or one special experiment in lieu of them, should be made by each Assistant and District Deputy Collector in charge of tálukás. No experiments were made in the Ahmadabad and Kánara Districts, on the ground that the officers there had no time to spare for the work.

3. It has been found necessary to omit altogether twelve experiments from this report, as the results cannot be considered trustworthy owing to want of accuracy in procedure, &c. In each case the justification for the omission is detailed in the analysis.

4. The experiments of Messrs. Todd, Silcock, Davidson, Morrieson, Fraser, Robertson, Harvey and Rájárám Khanderáv were carefully conducted and reported. It is again necessary to desire the special attention of the experimenters to the standing orders issued from time to time on the subject.

I have the honour to be,
Sir,
Your most obedient Servant,

W. P SYMONDS,
Acting Director, Land Records and Agriculture.

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ANALYSIS OF CROP EXPERIMENTS.
NORTHERN DIVISION.
Ahmadabad.

Government Resolution No. 6997, dated 1st October 1886, Revenue Department, directed that each Assistant and District Deputy Collector should carry out one special experiment or two ordinary experiments in lieu of one special experiment on a holding, but in Ahmadabad the Collector reports that no crop experiments could be made owing to frequent changes of the district officers in charge of tálukás and to other reasons.

Kaira.

Mr. K. R. Bamanji, Assistant Collector.

This officer submits two experiments on wheat of different varieties, one being *Bhália*, apparently a dry-crop soft white variety, on a *berangi káli* or mixed black soil, and the other *popatia*, an irrigated variety, on a *gorádu* or light soil. In both the plots, the wheat was preceded by kharif crops such as rice, makái, and bájri, for which the season was favourable, the bájri being estimated at 12 annas. Both the plots were manured this year and cultivation was on an average good in both cases, but wheat appears to be more successful in gorádu soil than in berangi káli or mixed black which is a poorer soil. The season was good for rabi crops, but injury by fogs and frost reduced the average of the wheat crop to $6\frac{2}{3}$ annas for dry-crop and $8\frac{1}{3}$ annas for irrigated wheat.

The results are :—

Variety.	Estimate in Annas.	Yield.	Corresponding formulæ yield.
		Lbs.	Lbs.
Experiment No. 1 Bhália	8	765	900 (Mátar.)
„ „ 2 Popatia	12	1,859	1,200 (Thásra.)

Thus the yields in both cases were above the average for the district. The incidence in column 10 (Experiment No. 2) for Popatia would of course be much lower if the kharif crops grown in the field were taken into account.

Mr. Pránlál H., District Deputy Collector.

Experiment No. 3.—Mr. Pránlál contributes one experiment, which is termed a special one, but the memorandum of expenditure and income is defective. The rule of not including the local funds in the assessment has been lost sight of, and the local name of the variety has not been given. Mr. Pránlál should pay attention to the remarks on the sample form, Director's Annual Report, page 34, 1883-84, and on pages 8 and 9, Crop Experiment Report, 1884-85.

Panch Maha'ls.

Two officers made crop experiments this year in the district :—

	Ordinary.
Mr. Urquhart	1
„ Motilál Chunilál...	6

Besides these Mr. Motilál forwards 3 ordinary and 2 special experiments made by Mr. Rájárám Khanderáv last year.

Mr. G. M. Urquhart, Assistant Collector.

Mr. Urquhart sends in only 1 ordinary experiment on kharíf crop. He is, however, reported to have made a second test which he was unable to complete successfully. The experiment reported was made on rice (Jiresál). The seed-rate per acre for the transplanted area is 25 lbs. according to the formulæ for the

district while that given by Mr. Urquhart is 41 lbs. per acre, which would seem to be that for the transplanted area. The relation between *sers* and *lbs.* is not properly noted. The cultivation is stated to have been decidedly good and the soil, *gorádu kiári*, with sufficient manure. The crop was irrigated from a tank and was estimated at 14 annas. This is Mr. Urquhart's first experiment, and he seems to have taken great pains with it.

Mr. Motilál Chunilál, District Deputy Collector.

This officer sends in 6 ordinary experiments, 4 in Dohad and 2 in Jhálod tálukás of the district, one on maize, 4 on gram and one on wheat *vájia*. The maximum test area in these experiments is 2 acres 39 gunthás and the minimum 20 gunthás. It is not clear whether the areas were actually measured or not. I must again invite attention to the important point that areas entered in Village Form 3 cannot be accepted for the purposes of crop experiments and that actual measurement is absolutely essential. He has taken a great deal of trouble in making so many experiments, but the results are vitiated by inaccuracies. His experiments on gram are all made on very poor crops and hence give no correct idea of the average produce and incidence of assessment. His experiments are not reported in the statement.

Mr. R. K. Vaidya, District Deputy Collector,

All the tests taken by this officer (Experiments Nos. 5—9) refer to the previous year's season (1885-86), and are on maize, one of the staple crops of the district. The rate of seed per acre is below the average prescribed by the formulæ for the district, and the difference in yields shows the difference in tillage and soils on which the crop was grown. Whether rabi crops were grown on these plots is not noted.

Experiments Nos. 5 and 6 are tests taken in connection with the special experiments.

The results are :—

	Seed.	Yield.	Annas Estimate.	
	Lbs.	Lbs.	Annas.	
Experiment No. 5	6¼	1,231	10	Corresponding formulæ yield 16 annas, 1,600 lbs. the acre.
Do. 6	11	1,496	12	
Do. 7	10½	1,508	12	
Do. 8	11	1,284	10	
Do. 9	9¾	780	6	

Broach.

One officer in this district submits 2 ordinary experiments (Nos. 10 and 11). Mr. Chunilál reported that owing to other engagements he was unable to make crop experiments this year.

Mr. H. O. Quin, Assistant Collector.

Experiment No. 10, on wheat.—The local name of the variety is not given. The crop is estimated at 4 annas, but the character of the season is not noted. According to the formulæ a 4-anna yield is 300 lbs. of grain per acre. The actual yield in this experiment was 277 lbs. per acre. The formulæ estimate is known to be rather high for the Bhál lands of Ahmadabad and Broach. The seed-rate per acre given is less than the formulæ rate for the district (60 lbs.). Mr. Quin gives the yield of area experimented on in lbs. only without the equivalent local weight or measure.

The calculated incidence in column 10 is rather high, but the season was bad, and Mr. Quin appears to have been unlucky in his selection of the field for experiment, as the crop experimented on was below the average (6½ annas) for the district and still further below that for the táluka (8 annas). The second experiment (No. 11) was made on yellow juvár *Pila* on a *besar* soil. The usual

practice is to prepare the land for cotton, and then if the season be unfavourable for cotton, to sow juvár. This year the season was favourable to the latter crop. The rate of seed given per acre is 7½ lbs. which is less than the formulæ rate per acre (12 lbs.) but greater than the ordinary rate in the neighbourhood, *viz.*, 4 to 6 lbs.

Surat.

Of the experiments received this year from the district 1 was taken by Mr. Robertson, 3 by Mr. Pánse and 2 by Mr. Umedrám.

Mr. B. Robertson, Assistant Collector.

This officer forwards one experiment taken in the village of Supa in Jalálpur Táluka on sugarcane Malbári. The experiment was evidently made with care. Surat is the chief cane-growing district in Gujarát and the Malbári is the softest and most juicy variety. The cane in the eastern tálukás is, however, inferior to that grown to the south towards Gandevi Pargana. The land was irrigated from a well, and in years when cane is not grown, rice as kharíf and castor-oil seed and vál (Dolichos lablab) as rabi crops take its place. The crop which was of a medium quality, fairly represented the cane crop grown in the locality which was slightly injured by a long break in September. The cultivation was fair and the yield was estimated at 12 annas. Tops and leaves were not weighed.

Mr. G. D. Pánse, Assistant Collector.

Mr. Pánse contributes 3 ordinary experiments on juvár mixed with tur. The rain favoured the tur rather than the juvár. The latter was a poor, the former an excellent crop. I have omitted the experiments because the proportion of area under each crop has not been carefully considered and because the whole area is credited with juvár. The incidence calculated on the poor juvár alone is naturally very high, though for reasons unexplained it is asserted that the juvár was from a 10—14-anna crop in the different experiments—an assertion quite unsupported by the facts reported.

Mr. Umedrám R., District Deputy Collector.

This officer took two experiments on unmanured kharíf crops raised from rábed seedlings and grown in *Gorat* soil, in which vál (Dolichos lablab) is raised as a rabi crop. The cultivation was rather careless and the incidence is calculated on the kharíf rice alone. The by-product was weighed wet owing to the prospect of rain. The experimenter remarks that the seedlings raised in a rábed plot of 5 gunthás can be transplanted into an area of 22 gunthás in Balda and 19 gunthás in Párdi. This shows that the seed per acre shown in the statement refers to the rábed seed-bed and not to the transplanted area.

Tha'na.

Mr. Bagnell, from whom three ordinary experiments are received, is the only officer who undertook any crop experiments in this district. The Collector in his forwarding letter says :—Mr. Walker is without experience and undertook no experiment, while Mr. Sayad Nurruddinkhán made two tests in Kalyán on rice but left no notes in the office, and Mr. Heblikar's hands were too full this season with heavy magisterial and other duties to think of making any.

Mr. Bagnell's experiments were all on rice. The resulting yields in all the three experiments were high compared with the corresponding formulæ yield. The plot of Experiment No. 15 was in land reclaimed from the sea and was heavily manured with 120 cart-loads the acre of sweepings from the Bándra slaughter-house. It was sown at the commencement of the rains, no ráb being used. In Experiments Nos. 16 and 17 rábed seedlings were transplanted and manured at 3 cart-loads per acre with fish and oil-cake manure in equal quantities.

The low incidence in column 10 of experiment No. 15 is due to the low assessment on the reclaimed land. The high yield shows that the land has been greatly improved by the occupant.

In Thána, grain is usually measured and not weighed. A local *ser* of the grain should therefore have been forwarded to this office (G. R. No. 8149 of 19th November 1886, Revenue Department).

CENTRAL DIVISION.

Kha'ndesh.

Mr. R. A. L. Moore, Assistant Collector.

This officer sends in two ordinary experiments, one on wheat and the other on gram. The season was favourable to both, especially to the latter. But in the returns there is still some confusion between the *ser* measure of capacity and the weight *ser*. Last year Mr. Moore reported that 1 *ser* of capacity of bájri experimented on by him in Bhusával weighed 70 tolas and again this year in Jámner both gram and wheat are reported to weigh also 70 tolás per measure *ser* of capacity each. In his detailed calculations, in spite of the entry of 70 *tolás* for both wheat and gram as the weight of the contents of the capacity *ser*, Mr. Moore has taken wheat at 70 and gram at 140 *tolás*. The samples sent to this office purporting to be a *ser* measure of each weighed respectively 142 and 128 *tolás*. This gross inaccuracy makes it impossible to report the experiments.

Mr. H. A. Hughes, Assistant Collector.

Submits two ordinary experiments on wheat (Nos. 18 and 19) which were carefully made. He writes in his forwarding letter to the Collector :—

> "It was found impracticable, these tálukás being fairly well-to-do and the cultivators being generally somewhat large land-holders, to select a holding cultivated solely by and supporting the cultivator and his family, and owing to the lateness of the season, to find any crop but wheat."

In Experiment No. 18 nearly the whole of a Survey Number, forming part of the inám of the Pátil of Kharda, was experimented on. The land grows in rotation jowári, bájri, cotton and wheat. Bájri was slightly damaged by late rain, but on the whole the season was favourable to kharíf. The local name of the variety of wheat experimented on is not given. The sample of 1 *ser* capacity measure of wheat received at this office from Chopda weighed 147 *tolás*, while the experimenter's calculations in the statement are given at 140 *tolás* both in Shirpur and Chopda. It is not stated whether any kharíf crop was grown. The incidence in column 10 is on wheat (rabi) alone.

Mr. E. C. Morrieson, Assistant Collector.

Experiment No. 20.—This officer contributes one ordinary test on wheat in Taloda. The crop suffered from scant rain during sowing and from frost and high wind in February. The name of the local variety is *gora* probably Bansi, a hard white wheat. The experiment was carefully conducted, but there is some inaccuracy in the equivalents given for the *ser* measure of capacity. In columns 18 and 19 of the return the *ser* is taken as equivalent to from 144 to 147 *tolás*, whereas in the memorandum of cost it is taken as from 146 to 150 *tolás*. If the *ser* of capacity be taken as equivalent to $3\frac{3}{4}$ lbs. the exact number of *tolás* of 180 grains will be $145\frac{5}{8}$.

Na'sik.

The extraordinarily low yields reported from this district for the years 1883-84 and 1884-85 were fully noticed in the reports for those years, while the experiment made last year showed a very high yield, much above the bumper yield of the formulæ. These unsatisfactory and conflicting results demanded explanation and a special order was passed by Government directing that "each Assistant and District Deputy Collector in Násik should conduct 6 experiments in order to ascertain the average yield per acre of the staple crops of the district —wheat, bájri and jowári—with a view to reconcile these apparently irreconcilable results."

Accordingly 8 experiments were carried out this year, 5 by Mr. Davidson and 3 by Mr. Fraser; Mr. Shirhatti and Mr. Shridhar Gundo did not find time to perform any experiments. The experiments reported appear to have been carefully made. Mr. Fraser's experiments in particular show great accuracy and attention to standing orders.

Mr. S. M. Fraser, Assistant Collector.

Three ordinary experiments on rabi wheat (Bansi, hard red), (1) dry-crop (Experiment No. 21), (2) irrigated (Experiment No. 22), and (3) partially irrigated (Experiment No. 23). No kharif was grown this year in the plots under experiment, wheat being the sole crop. The field under Experiment No. 21 borders on a *nála* or stream and is said to contain subsoil water, which may possibly render it unsuitable for kharíf crops. The season was favourable at first, but the grain is said to have been slightly shrivelled by frost, the irrigated wheat suffering more than the dry crops. The yields in Experiments Nos. 21 and 23 agree with the corresponding formulæ yields, but that in Experiment No. 22 is low. The results are :—

No.	Anna estimate.	Yield.	Formulæ yield.	Incidence of Assessment.	Weight of capacity *ser*.
21	8	328	315	15·63	115
22	14	863	1,215	14·71	114½
23	8	510	475	9·21	113¾

Mr. J. Davidson, Assistant Collector.

Mr. Davidson reports 5 ordinary experiments, 2 on hard red wheat Baksi (Nos. 24 and 25), 2 on bájri (Nos. 26 and 27) and one on linseed (No. 28). In his Experiments Nos. 24 and 25 wheat followed kharíf til, which failed, and the incidence consequently appears high as the season was not good for irrigated wheat.

Experiments Nos. 26 and 27 on Bájri.—The rain in October was excessive and proved injurious to bájri. The incidence of assessment in Experiment No. 27 is rather high, presumably due to indifferent cultivation.

Experiment No. 28, Linseed.—Since the receipt of instructions of the Government of India to prepare forecasts of oil-seed along with those of wheat and cotton this crop has attracted my particular notice, as it is grown in this Presidency as an oil-seed and not for flax. This was consequently one of the crops selected last year for special enquiry, but only one experiment was made on it on a poor soil. So it was then desired that this crop should again be specially selected for experiment this year wherever available. Linseed is reported to have been grown in Násik this year to such an extent as to affect sensibly the area under wheat. In the field experimented on linseed mixed with a little mustard was the sole crop of the year, and though the year's crop as a rule suffered from the fungoid disease, the plot under experiment escaped, and the yield (estimated at 14 annas) was 225 lbs. of linseed with 4¾ lbs. of mustard. The corresponding formulæ yield is 450 lbs. of linseed. The formulæ estimate at indiscriminately 500 lbs. the acre in every táluka without considering the soil and climate, &c., as was the case found in Dhárwár last year, appears rather high.

Ahmadnagar.

Mr. G. P. Thakár, Additional District Deputy Collector, forwards 2 ordinary experiments (Nos. 29 and 30) made by Mr. Harvey, one on jowári and the other on gram, and one ordinary experiment has been received from Mr. N. B. Mule, District Deputy Collector.

Experiment No. 29 on Jowári.—The details of cultivation are :—The area is part of a field (area—24 acres, 24 gunthás) which was left fallow for 7 years till the last year when jowári was sown. It was not manured or ploughed but harrowed 5 times with a 2-bullock hoe for 26 days. Nothing was done between sowing and reaping. The seed used was safflower mixed with jowári in the proportion of 3 to 1, but it is not clear to what area the number of lbs given is meant to apply. The amount of seed entered should invariably be the rate per acre. In the present case the formulæ rate per acre of jowári seed mixed with some other is 6 lbs., but the experimenter states that 60 lbs. safflower and 20 lbs. jowári were used. The safflower failed and the experiment was made on jowári alone, which was also damaged. The weight of grain compared with that of the straw is low. In columns 18 and 19 of the return the experimenter notes that 23½ *sers* are equal to 57 lbs. and 34 *tolás*, but does not state whether the pound

is equal to 39 or 40 *tolás*, nor does he give the weight of the *ser* measure of capacity. The information required for columns 21 and 22 of the sample form is also omitted, and it is therefore difficult to check the figures in columns 23, 24 and 25.

Mr. Harvey's second experiment (Experiment No. 30) relates to a field on which various crops are grown on different plots according to the nature of the season. It would have been interesting if the experimenter had stated (1) what kharif crop in case of scant early rainfall is followed by another kharif or rabi crop, and (2) what crops (khárif or rábi) are sown as mixed in the locality. This experiment was on gram, unmanured and sown by itself; whether kharif was grown on this land is not stated. The land was once ploughed and twice harrowed and nothing was done to it after sowing. The rate of seed (60 lbs.) is nearly double the formulæ rate for the acre (*vide* remarks on Experiment No. 29).

The yield of the test area was :—

25 *sers*=73 lbs. and 13 *tolás*; therefore
1 *ser* = 114½ *tolás* if 1 lb. =39 *tolás*,
or = 117⅓ do. 40 ,,

A *ser* of grain was not forwarded to this office, but the figures given in the return may be taken as fairly accurate. The high incidence is due to omission of the kharíf and to indifferent cultivation and the year's irregular rainfall.

Mr. N. B. Mule, District Deputy Collector.

Submits one ordinary experiment No. 31 conducted in Kopargaon Táluka on wheat locally called *Sudhe*. Except that the experimenter takes his lb. as equal to 40 tolás and omits to note the prices at which the value of the crop experimented on was calculated, the test as an ordinary experiment evinces care. His details of cost and agricultural implements required for the cultivation of wheat in the táluka are interesting, but the estimates of cost of their wear and tear appear doubtful, since it is not distinctly stated whether the cultivator cultivates only one survey number experimented on.

Poona.

Only one experiment (No. 32) was received this year from this district, *viz*, an ordinary test on late or wet weather jowári crop in the Sirúr Táluka. The crop was damaged by irregular rainfall, and the result is :—

Estimate in annas.	Formulæ yield.	Actual yield.	By-product.
	Lbs.	Lbs.	
12	1,120	340	lbs. 1,800+120=1,920

The grain yield is low compared with straw. The seed rate is also low.

Shola'pur.

Mr. Silcock contributes two ordinary experiments and Mr. Vádekar special experiment from this district.

Mr. H. F. Silcock, Assistánt Collector.

Two most carefully made ordinary experiments, Nos. 33 and 34, on jowári locally called *máldandi* on two different soils in Tembhurni in Karmála Táluka of the district. Jowári and kardai were grown together, every 8 rows of jowári being followed by 1 row of kardai. The season was most unfavourable to kardai and only partially favourable to jowári, which owing to heavy October and December rains had a tendency to run to stalk, the heads of grain being small. The results per acre are :—

Experiment.	Anna-valuation.	Formulæ yield.	Actual Yield.	
			Grain.	Fodder.
		Lbs.	Lbs.	Lbs.
No. 33	8 to 10	490 to 870	430	1,505
„ 34	Do.	Do.	382	1,805

The loss of grain in Experiment No. 34 is accompanied by gain in straw. The experimenter also remarks that the straw in Experiment No 34 fetched a higher value and the grain a lower value than in Experiment No 33. The inference is that the *támbad* moravandi soil in Sholápur yields better grain in a season of heavy falls than *káli* moravandi, which has a tendency to grow too rank with irregular heavy falls.

Mr. V. B. Vádekar, District Deputy Collector.

This officer submits one test which he calls a special experiment, but the details of the cost of cultivation and profit are given with so little accuracy of detail that they cannot be accepted as trustworthy for record The weight of the contents of 1 local *ser* measure of the crop experimented on is not reported, nor was a sample forwarded to this office. No less than one acre was selected for experiment, but how was it measured is not noted. The value of the grain experimented on is estimated in Pandharpur Market at Rs. 2-10-8 and that of the straw at Rs. 3-0-4, *i.e.* the value of straw greater than that of the grain, which is curious.

Sa'ta'ra.

Three ordinary experiments, 2 on bájri and one on wheat, have been received from this district, all conducted by Mr. L. G. Deshmukh, Assistant Collector. This year's season was reported to have been good, both for bájri and irrigated wheat, yet the results of the experiments (Nos. 36 and 37 both on bájri) are:—

	Experiment.	Yield.		Anna-valuation.	Formulæ yield.	Incidence of Assessment.
		Grain.	Straw.			
		Lbs.	Lbs.		Lbs.	
Yield per acre	No. 36	486	17,006	10	500	5·89
" " "	" 37	106	1,746	2	35	10·79

The weight of straw in both the experiments is very high compared with that of the grain The weight of straw in Experiment No. 36 is 35 times that of the grain, while in Experiment No. 37, in which the yield of grain is poor, it is 16 times only. Th s is curious because usually the smaller the yield of grain, the greater the proportionate straw weight. The incidence in Experiment No. 37 is higher than in Experiment No. 36 on account of difference of soil, absence of manure and bad cultivation. Bájri was mixed with tur in Experiment No. 36 and matki and hulga in Experiment No. 37 in the proportion of 3 to 1. The experimenter rightly takes the proportionate area under bájri to arrive at the results of his experiments.

Experiment No. 38.—The area experimented on is ample for an irrigated crop test. The season for irrigated wheat this year was good and the average estimate 11½ *as.* for the district. The crop under experiment estimated at 14 annas yielded 1,466 lbs. the acre. The formulæ acre yield for the táluka is 1,620 lbs. The rate of seed is nearly double the formulæ rate.

Mr. C. G. Dodgson, Assistant Collector.

Contributes one ordinary experiment made by him in Karád Táluka in a survey number—5 acres and 34½ gunthás in area, and growing gram, pávta, earth-nut, tur and shálu. The experimenter seems to have experimented on all these crops but gives no area of test separately in the case of each crop, nor the proportion in which the crops were sown in the field, nor the areas occupied under each. Consequently with all the pains taken by the experimenter, the experiment is unintelligible and cannot yield any useful deductions. The experiment has been omitted from the statement.

SOUTHERN DIVISION.

Belgaum.

Two experiments (Nos. 39 and 40) were sent in this year from the district, both made by Mr. Sorábji Padamji. The other Assistant and Deputy Collectors, as the Collector remarks, "have been unable to make any on account of transfers and stress of work." Last year, numerous discrepancies were pointed out by the Collector and the Director in two experiments submitted by Mr. Sorábji Padamji, and this year's tests, though not quite complete and accurate, show some improvement. The experimenter explains in his remarks why the columns 4 and 5 in the tabular summary of his experiment (No. 39) on rice were left blank, but the explanation, in the opinion of the Collector, is unsatisfactory. The entries made in the return regarding manure (column 15) are ambiguous, and columns 18 and 19 do not show whether a *ser* measure of corn experimented on was actually weighed or whether the experimenter's lb. is equal to 39 or to 40 *tolás*. I am unable to check the figures in these columns, as a sample *ser* (Government Resolution No. 8149, dated 19th November 1886, Revenue Department) of the crop experimented on was not forwarded to this office. The grain yield per acre in Experiment No. 40 (1,184 lbs.) is very high for a 12-anna crop. According to the formulæ the yield is 800 lbs. the acre.

Dha'rwa'r.

Four ordinary experiments were received from this district, 2 from Mr. Knight and 2 from Mr. Purandhare.

Mr. R. Knight, Assistant Collector.

This officer submits 2 ordinary experiments (Nos. 41 and 42), 1 on jowári mixed with tur and mug, and the other on gram. In his Experiment No. 41, 10 *sers* of jowári, 16 *sers* of tur and 4 of mug were sown in the whole field 4 acres and 34 gunthás in area, but the experimenter does not note the number of rows of each crop either in the experimented area or in the acre, and it is therefore not possible to estimate exactly the area occupied by jowári and by the other crops or the proportionate yield if jowári be considered the only crop of the year. The results are :—

Crop.	Grain Yield.	Value.
		Rs. a. p.
Jowári	375 lbs.	8 14 4
Tur	26½ *sers* at 12 *sers* the rupee ...	2 3 4
Mug	10 do. 12 do. ...	0 13 4
	Total ...	11 15 0

Thus the estimated produce per acre is Rs. 11-15-0 and the assessment per acre Rs. 2-1-9, hence the percentage of assessment on gross produce is 18. The grain crop experimented on was weighed only 3 days after it was cut and the by-product was not weighed at all.

His other experiment (No. 42) is more accurate. But 1 lb. is taken as 40 tolás instead of 39 tolás usually taken for purely experimental purposes, and the sets of prices in columns 21 and 22 required by the remarks on the sample form are omitted.

Mr. V. R. Purandhare, District Deputy Collector.

Contributes two ordinary experiments (Nos. 43 and 44), 1 on jowári and the other on wheat. In his experiment on jowári Mr. Purandhare seems to

have weighed the by-product when very wet, and consequently the weight is high compared with that of the grain. He gives the weight of jowári as 144 *tolás* per local capacity *ser*. The contents of the *ser* forwarded to this office weighed 139 *tolás*. The experimenter does not give the sets of prices at which the value in columns 21 and 22 is estimated. In his second experiment (No. 44) the local name of variety of the crop experimented on is not noted, nor the proportion in which the two crops, wheat and kardai, were sown. The incidence in column 10 is calculated on wheat alone.

Bija'pur.

Mr. John FitzMaurice, Assistant Collector.

Contributes 2 tests, one on wheat and the other on gram, the results of which were embodied in a special experiment. In the experiment (No. 45) on wheat the local name of the variety is not given, probably a hard-red variety. Wheat was mixed with safflower in the proportion of 6 to 1. The experiment was confined to wheat alone and in order to ascertain the exact area under wheat the experimenter measured a 10-guntha plot in which wheat and safflower were sown in rows, 6 rows of the former to one of the latter, so that in 10-guntha area the actual area under wheat was $10 \times \frac{6}{7}$ g. $= 8\frac{4}{7}$. In his experiment on gram (No. 46) the area is below the prescribed minimum and therefore the test is inadmissible as an ordinary experiment.

Kola'ba.

Four ordinary experiments were received from the district, two of which were conducted by Mr. Drew and the remainder two by Mr. Jaykar—all on rice.

Mr. W. W. Drew, Assistant Collector.

Contributes 2 ordinary experiments (Experiments Nos. 47 and 48) in Pen Táluka on different kinds of soils growing kharif rice, the staple food of the district, but does not state whether any rabi crops were grown off the fields experimented on. The local estimate in annas is not noted. It would have been useful to know on what portion of the field ráb was burnt. The remarks on the sample form require that a separate statement showing the area transplanted from the seed-bed together with its size and proportion should be given. The crop experimented on should be weighed when it is completely dry and the result noted in columns 18 and 19. To enable me to check the figures in columns 21 and 22 the two sets of prices should have been given, those prevailing at the time of the experiment and those at the time of the 1st or 2nd instalment.

Mr. R. S. Jaykar, District Deputy Collector.

Sends in two ordinary experiments (Nos. 49 and 50) on rice in Mángaon. The area is ampler than the prescribed minimum but the by-product weighs less than the grain, which throws doubt on the measurement of the grain. Figures in columns 18 and 19 show that the experimenter's *ser* is equal to 55 *tolás*, but he does not seem to have attended to instructions to take the lb. as 39 *tolás* for experimental purposes.

Ratna'giri.

Three officers made crop experiments this year in the district. They are specially interesting, as most of them are in rábed plots with fish manure as a top dressing.

Mr. J. H. Todd, Assistant Collector.

Forwards one ordinary experiment (No. 51) on sugarcane. The name of the variety is Támbi or red. This experiment has special interest inasmuch as it represents a test on sugarcane grown in rábed plots and manured with fish manure—a case rarely to be met with in Gujarát, the Deccan or the Karnátak. The yield is estimated at 12 annas, 4,000 lbs. the acre according to the formulæ, while the actual yield is 1,260 lbs. of gul and 96 lbs. of treacle. The weight of the cane is not given and the crushed cane was not weighed. Attention is invited to the

remarks on sugarcane experiments and the manner in which the results should be shown (*vide* p. 26, Crop Experiment Report, 1883-84).

Mr. W. Doderet, Assistant Collector.

Contributes two ordinary experiments (Nos. 52 and 53), one on nágli and one on rice, both in rábed plots with fish manure. In the experiment on nágli the area is below the prescribed minimum for the dry crops (6 gunthás according to the standing orders), but the experimenter gives reasons for not selecting a larger area. He says that fish manure was used for the transplanted area, but whether ráb was used or not is not clear. The anna-valuation of the crops is not noted. The figures are rather doubtful as the crop was weighed when wet and the prices at which the value of the crop was estimated are approximate only. Mr. Doderet departing on privilege leave was unable to give further information on these points, and the Collector does not clear them. The account of the cultivation of these crops given by the experimenter is very interesting. The experiment on rice (No. 53) was on rábed plots with fish manure, but the rate of seed given is rather ambiguous.

Mr. W. C. Rand, Assistant Collector.

Forwards two ordinary experiments, one on rice (Experiment No. 54) mixed with an equal quantity of pávta (Dolichos lablab), and the other on vari (Experiment No. 55). The grain and straw were weighed when wet, and a reasonable deduction made for dryage; but whether the proportion was fixed on actual test or on mere guess is not stated, and the tests are therefore doubtful. The experimenter says that the heavy rains prevented him from taking the regular course. However the results are noted as reported. A *ser* measure of capacity was not received in this office, but the Collector reported the weight of 1 *ser* measure of rice to be 40½ *tolás* and of vari 47 *tolás*.

TABULAR SUMMARIES.

Summary of Crop Experiment

No	District, Ta'luka, Village and Experimenter.	Crop.	Local estimate in annas.	Average per Acre. Seed.	Yield of Principal product.	Yield of By-product.	Total value of produce.	Assessment excluding Local Funds.	Percentage of Assessment on value of gross Produce.
1	2	3	4	5	6	7	8	9	10
	KAIRA.			Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
	Mr. K. R. Bamanji, Assistant Collector.								
1	Thásra (Dákor)...	Dry-crop wheat (Bhália).	8	71	765 grain.	1,066 straw.	39 13 10	4 3 9	10·62
2	Do. (Thásra)	Irrigated spelt (Popatia).	12	71	1,859 grain.	...	45 3 0	3 14 7	8·65
	Mr. Pránlál Harkisandás, District Deputy Collector.								
3	Mátar (Rádu)	Soft white wheat (unirrigated).	10 to 12	87	975 grain.	1,250 straw.	41 14 0	4 1 10	9·83
	PANCH MAHA'LS.								
	Mr. Urquhart, Assistant Collector.								
4	Kálol (Málav)	Rice (Jiresál) .	14	41	2,188 grain.	2,053 straw.	63 5 4	10 15 6	17·32
	Mr. Rájárám Khanderáv, District Deputy Collector.								
5	Dohad (Pusri)	Maize... ...	10	6¼	1,231 grain.	1,333 straw.	30 0 0	1 6 5	4·67
6	Jhálod (Káligaum)	Do.	12	11	1,496 grain.	1,520 straw.	36 8 0	1 5 4	3·65
7	Dohad (Abhlod)	Do.	12	10½	1,508 grain.	2,400 straw.	37 0 0	1 9 4	4·28
8	Do. (Dohad)	Do.	10	11	1,284 grain.	2,400 straw.	31 4 8	2 3 11	7·17
9	Do. (Jaykot)	Do.	6	9¾	780 grain.	1,266 straw.	19 2 8	0 12 6	4·07
	BROACH.								
	Mr. H. O. Quin, Assistant Collector.								
10	Vágra (Váv)	Wheat, hard white.	4	46	277 grain.	318 straw.	10 6 8	3 2 9	30·45
11	A'mod (Dhansoti)	Juvár (Pila) yellow.	7	7½	711 grain.	2,731 straw.	24 14 11	4 15 0	19·8

Area of test.	Equivalent in tolás of measure ser.	Remarks.
11	12	13
30 G.	The local *ser* is a weight *ser*=40 *tolás*.	*Experiment No. 1.*—Bhália, a soft white variety of wheat (dry-crop) on a medium black sandy or *berangi kàli* soil. Manured before ploughing at 15 cart-loads per acre. The usual rotation, 1 castor-oil seed, 2 rice and gram, 3 rice. Season fair, though October rain not sufficient. Rice sown as a first crop in a portion of the field, but incidence in column 10 is calculated on wheat alone. Cultivation fair though neither hoe nor harrow was used and the crop estimated at 8 annas. The rate of seed (71 lbs.) reported appears higher than the formulæ rate (60 lbs.) per acre for the dry-crop wheat in the district.
10 G.		*Experiment No. 2.*—Irrigated and manured gorádu or light brown soil growing in rotation, 1 makai, bájri, wheat; 2 tobacco. The local name of the variety grown, Popatia. Rate of manure 7 cart-loads of cowdung per acre. Cultivation good, and the crop irrigated from a well, and though season indifferent, locally estimated at 12 annas, which according to the formulæ estimates for the táluka, represents 1,200 lbs. The entry in column 6 is doubtful. Spelt has a strong persistent husk and it is not stated whether the clean grain or the grain in husk was weighed.
8 G.		*Experiment No 3.*—Soft white wheat (unirrigated) grown on dry black soil. Manured with cowdung at the commencement of June at 20 cart-loads per acre. Cultivation very good, but rainfall unfavourable and a long break damaged the crop. The anna-valuation of the yield estimated at 10 to 12 annas which represented 750—900 lbs. per acre, while the result of the plot experimented on gave an acre yield of 975 lbs.
3 G.		*Experiment No. 4.*—Rice grown continuously under the Málav Tank on a gorádu kiári or embanked rice land. Manured at 15 cart-loads per acre with cowdung as a rule, but failing a sufficient supply, with sheep and goat droppings, annually in the seed-bed and every alternate year in the transplantation area. The field was sown in June in seed-bed and transplanted in August. Cultivation decidedly good, and the field being irrigated from the tank, the season had no effect on the crop, which was locally estimated at 14 annas, representing according to the formulæ for the táluka 2,625 lbs. per acre, while the actual yield shown in column 8 here is 2,188 lbs. per acre. The amount of seed is entered as reported, but no intimation is given as to how it was calculated.
12 G.		*Experiment No. 5.*—All these experiments (Nos. 5—9) refer to previous year's season and experiments Nos. 5 and 6 represent the tests taken in connection with special experiments. Maize followed by gram and wheat grown on ráti or red soil. Cultivation indifferent and the field not broken or properly weeded and the crop damaged by scant September rain. Manured. The amount of seed sown, rather less than the formulæ rate per acre (24 lbs.) for the district.
20 G.		*Experiment No. 6.*——Maize followed by wheat, gram, and udid on a grey and black soil of considerable depth. Manured in May at 8 cart-loads per acre; cultivation indifferent and the field full of weeds. Season unfavourable and the crop damaged by a break in September. Anna-yield estimated at 12 *as.* (1,200 lbs. the acre—formulæ). Seed in Col. 5 noted as reported but less than the formulæ rate for the district. Incidence in Col. 10 lower than in Experiment No. 5 probably due to a better soil.
10 G.		*Experiment No. 7.*—Maize following wheat and gram on a bhuri soil. Manured at 30 cart-loads per acre in June. Cultivation good but the crop damaged by scant September rain.
10 G.		*Experiment No. 8.*—Soil Kothuria or mixed grey and black. Manured and cultivated as above but the yield rather lower, *i. e.* 10 *as.* in local estimate, and hence the incidence of assessment high compared with Experiment No. 7.
6 G.		*Experiment No. 9.*—Soil black. Unmanured; cultivation indifferent; the field not ploughed nor weeded and the crop injured while in ears by want of rain in September. The rate of seed as in above appears very low compared with the formulæ rate for the district, 24 lbs. per acre.
6 G.		*Experiment No. 10.*—Dry crop unmanured wheat sown every alternate year on a black soil which is reported as usually left fallow during the first year. Cultivation indifferent and yield estimated at 4 annas which represents 300 lbs. per acre according to the formulæ for the táluka. The formulæ seed rate per acre 60 lbs.
6 G.		*Experiment No. 11.*—Unmanured yellow juvár (dry-crop) on a *besar* soil after cotton has failed. Cultivation indifferent but season, though unfavourable for wheat and cotton, favourable for juvár and the crop locally estimated at 7 annas (612 lbs. per acre according to the formulæ.) Seed sown per acre less than prescribed by the formulæ.

Summary of Crop Experiment

No.	District, Ta'luka, Village and Experimenter.	Crop.	Local Estimate in annas.	Average per Acre.											
				Seed.	Yield of		Total value of produce.			Assessment excluding Local Funds.			Percentage of Assessment on value of gross produce.
					Principal product.	By-product.							
1	2	3	4	5	6	7	8			9			10
				Lbs.	Lbs.	Lbs.	Rs.	a.	p.	Rs.	a.	p.	
	SURAT. *Mr. B. Robertson, Assistant Collector.*												
12	Jalálpur (Supa)	Sugarcane (Malbári.)	12	1,867 whole canes.	5,325 gul.	173 bundles on an average = 3,282 lbs. of green leaves and tops.	250	0	0	9	5	3	3·73
	Mr. Umedrám Ranchordás, District Deputy Collector.												
13	Párdi (Balda)	Rice (Kada) ...	8	94	537 grain.	1,146 straw.	12	6	10	6	1	1	48·82
14	Do. (Párdi)	Do. ...	12	94	1,444 grain.	2,853 straw.	33	6	1	7	14	3	23·63
	THÁNA. *Mr. H. W. J. Bagnell, Assistant Collector.*												
15	Salsette (Dánde)	Rice (Kuday) .	12	100	4,220 grain.	14,253 straw.	73	12	0	0	4	0	0·34
16	Do. Andheri	Do. (Patni).	12	100	4,676 grain.	11,200 straw.	105	14	2	7	3	2	6·80
17	Do. do.	Do. (do.).	12	100	5,896 grain.	12,786 straw.	98	14	3	7	9	6	7·68

Reports, Northern Division, 1886-87—continued.

Area of test.	Equivalent in tolás of measure ser.	REMARKS.
11	12	13
3 G.	37 = 1 local weight ser.	*Experiment No. 12.—Duyam* káli or medium black soil. Manured at the first ploughing with 27 loads of cowdung per acre and 1,067 lbs. of *khol* or castor-oil cake manure. Cultivation fair and the crop suffered from the commencing scant rain and a long break in August and September. The following rains were good and the crop estimated at 12 annas—5,250 lbs. of gul per acre by the formulæ for the táluka. Rotation—rice and castor-oil seed for the first two years followed by rice. Seed in Col. 5 is noted as reported, but according to the formulæ for the táluka 20,000 sets are required per acre. The yield in Col. 6 appears to justify the formulæ estimate representing a 12-anna crop in the táluka.
6 G.	Local *ser* a weight *ser* = 37 *tolás*.	*Experiment No. 13.*—Unmanured rice followed by vál in this year, but usually rice alone is the year's crop. Cultivation indifferent but season favourable till the end of July, yet the crop, through September scant rain, stunted in growth. Incidence in column 10 is calculated on rice alone. The rate seed in column 5 given as reported but appears to be the rate of seed sown in the seed-bed and not in the transplanted area. The incidence in column 10 would be lower if the other crop grown on the land were taken into account as last year, though the early rains were unfavourable to rice owing to a long break in September, the late rains were favourable to other crops in the Surat District.
9 G.		*Experiment No. 14.*—Do. do. ; cultivation good.
6 G.	Measure *ser*=80 *tolás*.	*Experiment No. 15.*—Unirrigated, unrábed rice grown every year on a land reclaimed from the sea side and sweetened by heavy sweepings manure. Manured in June, July, and August with sweepings from Bándra slaughter-house at 120 cart-loads per acre. Cultivation good, but the most persistent growth of weeds in the field stunted the growth of the crop. Season, though marked by excessive rainfall, was not unfavourable to rice crops in the district. The seed was sown in the highly manured soil and the seedlings where very thick were removed and transplanted elsewhere. The yield locally estimated at 12 annas,—1,600 lbs. per acre, according to the formulæ for the táluka. The rate of seed compared with the formulæ rate (=60 lbs. per acre) high. By-product not accurately estimated.
12 G.	Do. ...	*Experiments Nos. 16 and 17.*—These 2 experiments represent rice unirrigated but rábed in seed-bed. The seedlings of both transplanted and manured after the first fall of rain, in equal quantities with fish and castor-oil cake manure at 3¼ cart-loads per acre ; cultivation good and season marked by excessive rain yet favourable. Straw not weighed.
6 G.		

Summary of Crop Experiment

No.	District, Ta'luka, village and Experimenter.	Crop.	Local estimate in annas.	Average per Acre.					
				Seed.	Yield of. Principal product.	Yield of. By-product.	Total value of produce.	Assessment excluding Local Funds.	Percentage of assessment on the value of gross produce.
1	2	3	4	5	6	7	8	9	10
	KHA'NDESH.			Lbs.	Lbs.	Lbs.	Rs a. p.	Rs. a. p.	
	Mr. H. A. Hughes, Assistant Collector.								
18	Shirpur (Kharda Budruk) ...	Dry-crop wheat hard white.	12	67	575 grain.	1,390 chaff.	18 12 0	2 9 8	13·88
19	Chopda (Tavsa Khurd) ...	Do. ...	16	75	689 grain.	900 chaff.	26 0 0	1 15 4	7·54
	Mr. E. C. Morrieson, Assistant Collector.								
20	Taloda (Taloda)	Dry-crop wheat, "Gora" white hard.	12	78	590 grain.	827 chaff.	20 4 5	2 10 8	13·15
	NA'SIK.								
	Mr. S. M. Fraser, Assistant Collector.								
21	Násik (Vadále)	Dry-crop wheat, hard red 'Bansi'	8	$33\frac{1}{10}$	$328\frac{1}{4}$ grain.	$643\frac{1}{8}$ chaff.	11 10 8	1 13 2	15·63
22	Násik (Násik)	Do. irrigated.	14	$46\frac{1}{4}$	$863\frac{1}{2}$ grain.	$1,165\frac{3}{8}$ chaff.	30 12 3	4 8 5	14·71
23	Do. do.	Hard red (Bansi) wheat.	8	$79\frac{3}{8}$	510 grain.	760 chaff.	18 7 7	1 11 3	9·21
	Mr. J. Davidson, Assistant Collector.								
24	Báglán (Taikhed) ...	Wheat hard red "Lál Baksi" irrigated.	10 to 11	105	945 grain.	2,220 chaff.	37 1 4	11 10 8	31·46
25	Do. do.	Wheat, hard red, "Lál Baksi" irrigated.	9	$74\frac{1}{4}$	792 grain.	1,339 chaff.	29 2 8	11 13 4	40·57
26	Málegaon (Sohegaon)	Green bájri, "Hirvigár."	12	nearly 4	522 grain.	1,775 kadba, 205 bhusa.	14 13 11	0 15 11	6·68
27	Do do.	Do. ...	4	10	239 grain.	975 kadba, 105 bhusa.	7 5 1	0 13 8	11·67
28	Do. do.	Linseed ...	14	$7\frac{1}{2}$ linseed, and some mustard	225 linseed and $4\frac{3}{4}$ mustard	...	10 15 5 and 0 3 4 / 11 2 9	0 12 5	6·94

Area of test	Equivalent in tolás of measure ser.	Remarks.
11	12	13
8 G.	140	*Experiment No. 18.*—Wheat on a good black soil or *avalkáli jamin.* Rotation—jowári, bájri, cotton and wheat. Manured every alternate year at 15 cart-loads per acre. Cultivation good and season fair, *i.e.*, rainfall somewhat timely and sufficient, but the crop injured by intense cold and prevalent westerly wind stunting the grain. Yield estimated at 12 annas or according to the experimenter below it. Seed in column 5 high and yield in column 6 low, compared with the formulæ rates which are 32 and 800 lbs. per acre respectively. No kharif crops grown on the soil reported and the incidence calculated on rabi wheat alone.
19 G.	140	*Experiment No. 19.*—Wheat on similarly conditioned soil. Season excellent and crop estimated at 16 annas which represents locally an average crop. Incidence compared with the above experiment (No. 18) low, presumably due to better tillage and more manure (17 cart-loads per acre) used. In this and the above experiment the calculations in the statement are given at 140 tolás the *ser* of capacity, while the sample of Chopda capacity *ser* received from the experimenter weighed 147 tolás on 8th September 1887. 140 tolás seem to be the nominal weight of the Khándesh capacity *ser*.
9 G.	...	*Experiment No. 20.*—Ráychikan or light black soil growing in rotation bájri and til, or rice (kharif) followed by rabi gram or wheat. Unmanured white wheat; cultivation good but the sowing rain scant and the crop damaged by frost and February west wind. No kharif crop reported as grown. The weight of *ser* measure of capacity in Taloda weighed 146¼, while the figure in column 6 calculated at 147⅜ tolás per *ser* of capacity which shows that the corn was weighed when it was rather wet.
12 G.	115	*Experiment No. 21.*—Manured dry-crop wheat Bansi continually grown on a Kálvat or medium black soil gradually deteriorating on account of a stream or nála running through it in monsoon. Cultivation fair, but the October rain heavy which delayed the sowing for a month, and though the crop was untouched by rust the grain was shrivelled by severe cold in mid January. The yield in local estimation 8 annas, representing 315 lbs. per acre according to the formulæ for the táluka. By-product nearly double of the grain yield. Price 10 sers the rupee on March 23rd and 9$\frac{11}{16}$ *sers* on the 10th April. One *ser* after 4 weighings on different occasions averaged 115 *tolás.* But in an experiment last year 1 *ser* wheat is reported to weigh 120 *tolás* (*vide* Crop Experiment Report, pages 12—13, for 1885-86). The difference is due to the damage to the grain done by the rust.
9 G.	114½	*Experiment No. 22.*—Irrigated Bansi or hard red wheat. Soil Barki or medium black, growing groundnut if rain early and heavy, and bájri followed by gram if rain late and less. Manured in June before harrowing at 8 cart-loads the acre. Cultivation good and crop free from weeds. Season favourable and the crop suffered from no rust but grain shrivelled by excessive cold. Yield estimated at 14 annas—1,215 lbs. the acre by formulæ for the táluka. Rate of seed rather high compared with the formulæ rate. Prices the same as above.
3 G.	113¾	*Experiment No. 23.*—Dry-crop but partially irrigated; unmanured black soil, Barki, growing continually wheat. Cultivation poor but season good and crop untouched by rust, yet grain slightly shrivelled by cold. The yield in local estimate at 8 annas—475 lbs. the acre (formulæ). Seed given as reported but compared with the formulæ rate (=32 lbs.) too high. Incidence is low compared with the other two experiments (Nos. 21 and 22) and is perhaps due to irrigation and season as the cultivation is reported poor and no manure was applied. By a comparison of the weights of the grains in these 3 experiments, (Nos. 21, 22 and 23) however, the yield in the last appears to be lightest and consequently lowest in quality.
4 G.	123	*Experiment No. 24.*—Wheat hard red Baksi (Bágáyat) on a lightish soil, irrigated from pát. Manured with ordinary village sweepings at 45 cart loads two years ago and 13½ cart-loads last year. Cultivation excellent and season promised well but frost in the 2nd week in February injured the crop. Yield according to the local estimate 10 to 11 annas—(840—975 lbs. the acre, formulæ). Rotation—1 rice, 2 sugarcane, 3 tili, followed by wheat. Chaff compared with grain, high. The rate of seed noted as reported but appears very high, the ordinary (formulæ) rate being 32 lbs. the acre. Wheat followed tili which was stated to have turned out very badly. The high incidence is due to the land being classed as pátasthal and to its being calculated on one crop only, while two or perhaps more crops could be grown with the available irrigation.
4 G.	128¾	*Experiment No. 25.*—Soil fair brown, manured at 39 cart-loads per acre 2 years ago and 56 cart-loads last year. Other circumstances the same as above (Experiment No. 24), yet the crop locally estimated at 9 annas—675 lbs. the acre (formulæ). High incidence in this case due perhaps to injury by frost to wheat (rabi) following the poor kharif tili (4 *as.*) which is not included in the test.
8 G.	129	*Experiment No. 26.*—Hirvigár, unirrigated green bájri. Manured at 12 cart-loads the acre. Soil medium black, growing alternately kharif and rabi crops. Cultivation distinctly good, and early rains favourable, yet a long break in September damaged the crop. Yield estimated at 12 annas—640 lbs the acre (formulæ). Seed below the average rate for the táluka.
8 G.	129	*Experiment No. 27.*—Green bájri on a reddish black soil. Rotation—1 cotton and bájri, 2 linseed, dádar and cotton, and 3 bájri and dádar. Unmanured. Cultivation indifferent. The crop poor, *i.e.* 4 annas, much below the average for the táluka.
8 G.	117 (Linseed)	*Experiment No. 28.*—Linseed and mustard on fair black soil (reddish). Unmanured. Cultivation good and the crop though in places injured by rust locally estimated at 14 annas—450lbs. the acre—formulæ. Seed noted as reported but below the average for the district. Incidence on both linseed and mustard.

Summary of Crop Experiment

No.	District, Táluka, village and Experimenter.	Crop.	Local estimate in annas.	Average per Acre. Seed.	Yield. Principal product.	Yield. By-product.	Total value of produce.	Assessment excluding Local Funds.	Percentage of assessment on the value of gross produce.
1	2	3	4	5	6	7	8	9	10
				Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
	AHMADNAGAR.								
	Mr. W. Harvey, Assistant Collector.								
29	Karjat (Nimbgaon Daku) ..	Jowári "Bedri".	10	2½	385⅚ grain.	3,200 kadbi.	8 6 2	0 2 6	1·86
30	Jámkhed (Kade)	Gram	9	60	366⅔ grain.	397½ chaff.	8 7 0	0 14 6	10·74
	Mr. N. B. Mule, District Deputy Collector.								
31	Kopargaon (Chitali)	Irrigated wheat "Sudhe."	14	48	1,229 grain.	1,513 bhusa; 1,167 kadbi.	43 1 2	0 15 9	2·28
	POONA								
	Mr. P. C. H. Snow, Assistant Collector.								
32	Sirur (Vadgaon Rásai) ...	Jowári "Shálu" unirrigated.	12	7	340 grain	120 chaff; 1,800 kadbi.	10 6 8	0 14 6	8·70
	SHOLA'PUR								
	Mr. H. F. Silcock, Assistant Collector.								
33	Karmála (Tembhurni)... ...	Jowári with safflower.	8 to 10	3	430 grain	1,505 kadbi.	6 15 4	0 8 8	7·78
34	Do. do. ...	Do.	Do.	5½	382 grain	1,805 do .	6 2 6	0 12 1	12·26
	Mr. V. B. Vádekar, District Deputy Collector.								
35	Pandharpur (Pandharpur) ...	Jowári ...	8	7	168 grain.	875 kadbi, 6 chaff.	5 11 0	0 12 9	14·01
	SA'TA'RA.								
	Mr. L. G. Deshmukh, Assistant Collector.								
36	Khatáv (Vardhangad)	Bájri	10	5	486 grain.	17,006 kadbi.	11 10 8	0 11 0	5·89
37	Do. (Ner)	Do.	2	5	106 grain	1,746 kadbi	2 3 6	0 3 10	10·79
38	Khánápur (Vito)	Irrigated wheat, 'Khapli.'	14	94½	1,466⅔ grain.	2,880 chaff.	37 11 4	1 0 10	2·79

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Area of test.	Equivalent in tolás of measure ser.	Remarks.
11	12	13
6 G.	...	*Experiment No. 29.*—Unmanured safflower mixed with cold weather jowári in the proportion of 3 to 1 on a field consisting of *málrán* light and *káli* black soils. Cultivation good and the field free from weeds, but the crop damaged by irregular and heavy December rainfall. The yield estimated at 10 annas—745 lbs. according to the formulæ for the táluka, but the actual yield shown in column 6 about half. Kardai was a failure and incidence in column 10 calculated on jowári alone. The rate of seed reported compared with the formulæ rate for jowári mixed with kardai—6 lbs., high. Weight of contents of *ser* of capacity not reported, nor sample of the crop experimented on forwarded to this office as required by the rules.
8 G.	...	*Experiment No. 30.*—Unmanured gram on a black soil growing cotton, jowári, kardai, linseed, til, rála and hulga in different parts of the field. Cultivation indifferent and the unseasonable and heavy December rain reduced the crop to 9 annas—300 lbs. per acre (formulæ). Rate of seed compared with the formulæ rate—30 lbs. per acre, high. No kharif crop reported and the incidence calculated on gram alone.
6½ G.	...	*Experiment No. 31.*—Unmanured wheat "Sudhe" on black soil locally called "gaváli." Irrigated from a well and growing bájri or wheat alternately. Season fair and the crop estimated at 14 annas—1,215 lbs. the acre (formulæ). Seed rate higher than formulæ seed rate. The incidence is low because the well is not taken into count in the assessment of the land. It is a private improvement.
6 G.	113⅓	*Experiment No. 32.*—Unmanured dry-crop jowári (late) continuously grown on kálvat or blackish soil. Cultivation good but the crop being sown early was injured by the heavy and untimely fall of rain at the close of the monsoon. The yield locally estimated at 12 annas, representing 1,120 lbs. according to the formulæ for the táluka. Rate of seed noted as reported, but compared with the formulæ rate 10 lbs. the acre, low. Whether any kharif crop was grown on the land is not stated, but the assessment shows that the land is fit to be cropped only once. One measure *ser* of capacity is taken by the experimenter at 113⅓ *tolás*, but according to an actual test made on 15th July 1887 in this office with the sample received the weight is 118 *tolás*.
4 G.	146	*Experiment No. 33.*—Unmanured jowári (mál dandi) with safflower in rows at the rate of 8 : 1. Soil stony black locally called *támbad moravandi* yielding with a moderate rainfall an excellent crop. Cultivation good, but heavy rains in October and December brought up new weeds and grass which injured the crop. Rate of seed according to the formulæ 6 lbs. per acre. Formulæ yield for 8—10 anna-valuation represents 490—870 lbs. per acre. Safflower failed and incidence in column 10 on jowári only. One measure *ser* of the crop weighed 146 tolás at the time of the experiment, but the nominal weight is 140 *tolás*. Rotation—(1) jowári and kardai, and (2) bájri, ambádi and hulga. Area of test below the prescribed minimum.
9 G.	146	*Experiment No. 34.*—Jowári (mál dandi) under similar circumstances on a fine medium black soil called *káli morawandi*. Cultivation good and field free from weeds though the crop had to contend with a similarly unfavourable season. As in Experiment No. 33, the incidence in column 10 on jowári alone, safflower being a failure. Rotation—(1) jowári with kardai, (2) jowári with kardai or gram with wheat. This experiment compared with the above experiment (No. 33) shows smaller yield of grain, but more straw fetching a higher value and also a higher incidence (column 10).
40 G.	...	*Experiment No. 35.*—Late jowári on unmanured black soil. Cultivation good, but the rain scanty at the sowing time and heavy after the seedlings have come up about 6 inches high, reduced the crop to 8 annas—490 lbs. the acre for the táluka (formulæ). Seed less than the average prescribed by the formulæ (10 lbs.) Straw compared with grain both in quantity and value, high. Weight of contents of one local *ser* measure not reported, but the nominal weight appears to be 140 *tolás*.
6 G.	108	*Experiment No. 36.*—Bájri with tur on light black soil. Manured with cowdung and ashes. Cultivation good and season fair. The yield locally estimated at 10 annas—500 lbs. the acre according to the formulæ for the táluka. For every 3 rows of bájri one row of tur was sown, but the incidence is calculated as if the whole field was sown with bájri. Straw compared with grain very high or perhaps weighed when green and moist.
6 G.	108	*Experiment No. 37.*—Unmanured bájri with hulga and matki at 3 rows of bájri with one row of other crops. Soil hard brown. Cultivation indifferent and season fair. The crop in local estimation 2 annas—35 lbs. per acre (formulæ). As in the preceding experiment (No. 36), 3 rows of bájri followed by one row of hulga and matki, and the incidence on bájri only. Compared with the results in the Experiment No. 36, the proportion between grain and straw yield low, and the high incidence presumably owing to difference of soil, absence of manure and bad cultivation. It is not stated whether bájri in these two fields was sown for fodder only.
4 G.	110	*Experiment No. 38.*—Wheat Khapli irrigated from a neighbouring stream and well. Soil black, manured in October-November with sheep manure before sowing. Season favourable and cultivation good. The crop fairer than the average for the district (11⅓ annas) but less than the corresponding formulæ acre yield=1,620 lbs. Seed in column 5 more than double the average per acre prescribed by the formulæ (45 lbs.)

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Summary of the Crop Experiment

No.	District, Ta'luka, Village and Experimenter.	Crop.	Local Estimate in annas.	Average per Acre. Seed.	Yield of Principal product.	Yield of By-product.	Total value of produce.	Assessment excluding Local Funds.	Percentage of Assessment on value of gross produce.
1	2	3	4	5	6	7	8	9	10
				Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
	BELGAUM								
	Mr. Sorábji Padamji, Assistant Collector.								
39	Belgaum (Bastvád) ...	Rice "Ambar-sál."	...	...	892 grain.	380 husk, 56 bran, 1,440 straw.	49 0 0	2 14 0	5·87
40	Do. (Bágevádi) ...	Jowári "gund."	12	6	1,184 grain.	2,944 straw.	23 6 0	1 7 9	6·35
	DHÁRWÁR.								
	Mr. R. Knight, Assistant Collector.								
41	Karajgi (Kalsur)	Jowári "Jvála" variety "Pul-gar."	8 to 10	4⅓ jowári, 6¾ tur, 2⅛ mug.	375 jowári	7 káts kadbi & 4 annas worth bhus.	8 14 4	2 1 9	23·71
42	Hángal (Hángal)... ...	Gram "Kempu" red & "Kare" black mixed together.	6	60	291 grain.	...	9 2 4	3 0 6	33·14
	Mr. V. R. Purandhare, District Deputy Collector.								
43	Ron (Ron)	Jowári ...	12	7½	1,181 grain.	9,844 straw.	19 12 4	0 6 8	2·10
44	Do. (Sandigvád)	Dry-crop wheat.	7	22 wheat and 1½ saf-flower.	244 grain.	288 chaff.	7 0 0	0 12 0	10·71
	BIJÁPUR.								
	Mr. J. FitzMaurice, Assistant Collector.								
45	Hungund (Ilkal)	Dry-crop wheat.	8	7½	197½ grain.	289½ chaff.	5 11 9	0 11 6	12·53
46	Do. do. ...	Gram... ...	10	5	504½ grain.	...	13 2 0	0 8 0	3·80
	KOLÁBA								
	Mr. W. W. Drew, Assistant Collector.								
47	Pen (Palas)	Rice (Dodki)...	...	50½	1,493 grain.	1,240 straw.	36 1 11	3 4 7	9·9
48	Do. (Pátansai)	Do.	...	63¾	1,253 grain.	1,796 straw.	28 1 0	5 0 8	17·96

Area of test.	Equivalent in tolás of measure ser.	REMARKS.
11	12	13
10 G.	...	*Experiment No. 39.*—Continuous rice on good ráng (rice) land. Manured with ashes and house rubbish. Cultivation good. The land gives only one crop and no rabi crop grown.
20 G.	...	*Experiment No. 40.*—Soil yeri or black, growing jowári followed by chillies or wheat in alternate years. Manured with cowdung and sweepings. Cultivation fair, but the crop good and locally estimated at 12 annas—800 lbs. the acre according to the formulæ for the táluka. Rate of seed compared with the average formulæ estimate per acre, low.
10 G.	145	*Experiment No. 41.*—Soil black or "yeri mannu" growing alternately jowári and cotton. Cultivation average and the season fair for dry-crops. Jowári estimated at 8 to 10 annas—455 to 810 lbs. the acre, according to the formulæ for the táluka. Jowári was mixed with tur and mug, seed sown being in the proportion of 1 to 2, but the incidence calculated on jowári alone and hence high. Contents of *ser* of capacity not forwarded to this office.
10 G.	155	*Experiment No. 42.*—Gram following the kharíf rice. Soil kárálu or brown manured for rice in April; though suitable for rice, not favourable to gram. Cultivation indifferent and the crop partly damaged by insufficient rain. The yield estimated at 6 annas, *viz.* 120 lbs. per acre in the táluka (formulæ). The high incidence is due to the kharif rice not being taken into account. The yield compared with the formulæ rate of yield rather high, but probably because the grain was weighed when not sufficiently dry. The contents of the *ser* forwarded to this office weighed 154½ *tolás*. The rate of seed per acre reported is very high.
10 G	144	*Experiment No. 43.*—Continuous jowári on *kemp* or red soil not as productive as black soil; manured besides sheep manure with cowdung and sweepings at 15 cart-loads the acre. Cultivation good and the field well weeded, but the early rains timely and sufficient, yet the late rains scant and unfavourable. The crop only 12 annas in local estimation—1,120 lbs. the acre according to the formulæ. The weight of the contents of 1 local capacity *ser* is given as reported, but those forwarded to this office weighed 139 *tolás* the 1 *ser* of capacity. Straw compared with grain rather high, presumably weighed when wet and green.
10 G	146	*Experiment No. 44.*—Soil black or *Kare nela* with sand or *tavadbai*. Unmanured wheat. Rotation—jowári, cotton and wheat. Cultivation fair and season more favourable to jowári than to wheat. Sowing rain scant and the crop estimated at 7 annas—270 lbs. the acre according to the formulæ for the táluka. Wheat sown with safflower, but how many rows of wheat to safflower is not noted. Incidence in column 10 on wheat alone.
8¼ G	85⅓	*Experiment No. 45.*—Wheat mixed with safflower on a black soil; manured. Cultivation bad and season unfavourable. Six rows of wheat were followed by one row of safflower. The incidence in column 10 is on wheat alone.
1 G	83⅓	*Experiment No. 46.*—Area of test below the prescribed minimum. Gram on a black soil. Cultivation indifferent but season fair.
		Experiments Nos. 45 and 46 are tests taken in connection with a special experiment.
19 G	55	*Experiment No. 47.*—Soil clayey or *chikan*. Rice locally called *Dodki* manured per acre at 20 cart-loads of cowdung and 15 bundles of hay which were spread on the ground and covered with earth and burnt before the rains. Cultivation indifferent. Early rains heavy and October rains scant and unfavourable. Straw compared with grain very low. The rate of seed 50⅓ lbs. per acre sown in a rábed seed-bed and then seedlings transplanted Formulæ rate of seed per acre 60 lbs. of sweet rice.
29¾ G	55	*Experiment No. 48.*—Rábed *dodki* rice on a different kind of soil locally called *dagadmáti* or stony soil. Rábed and with manure per acre at 20 herds of sheep folded for 1 month, 13 cart-loads of cowdung and 40 bundles of hay. Cultivation good and season the same as in the above. In both these experiments no local estimate of the yield in annas nor the equivalent of 1 measure *ser* in *tolás* given, nor the *ser* contents of the crop experimented on, sent to this office.

Summary of the Crop Experiment

No.	District, Ta'luka, Village and Experimenter.	Crop.	Local Estimate in annas	Average per Acre. Seed.	Yield of Principal product.	Yield of By-product.	Total value of produce.	Assessment excluding Local Funds.	Percentage of Assessment on the value of gross produce.
1	2	3	4	5	6	7	8	9	10
				Lbs.	Lbs.	Lbs.	Rs. a. p.	Rs. a. p.	
	KOLA'BA—*continued.*								
	Mr. R. S. Jaykar, District Deputy Collector.								
49	Mángaon (Khandad)	Rice "Harkale".	12	48	1,270 grain.	1,152 straw.	25 5 0	4 3 4	16·62
50	Do. do.	Do. ...	12	48	1,427 grain.	1,473 straw.	35 6 4	4 2 0	11·65
	RATNÁGIRI.								
	Mr. J. H. Todd, Assistant Collector.								
51	Tembhya (Ratnágiri)	Sugarcane "Támbi Us."	12	...	1,260 gul and 96 treacle.	16,226 tops.	124 8 3	7 1 5 including water-rates.	5·69
	Mr. W. Doderet, Assistant Collector.								
52	Ratnágiri (Mirya)	Late Nágli "Mahán".	...	11¼	1,747 grain.	...	45 6 2	1 5 4	2·93
53	Do. (Rahatghar) ...	Rice "Vágsál".	16	270	3,360 grain.	5,280 straw.	67 8 0	7 11 1	11·39
	Mr. W. C. Rand, Assistant Collector.								
54	Sangameshvar (Vándri) ...	Rice "Panvel".	12	18 rice and 18 pávta.	1,668 grain.	7,627 straw.	38 5 0	1 4 7 including water-charges.	3·35
55	Do. do. ...	Vari "Dudoura".	8	2 vari 15½ harik.	180 grain.	...	3 11 2	0 3 2	5·35

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Area of test.	Equivalent in tolás of measure ser.	REMARKS.
11	12	13
10 G.	55	*Experiment No. 49.*—Rábed rice *Harkale* on clayish soil. Manured in the seed-bed only. Cultivation fair but the field weedy. Early rain heavy and late rain continued too late. Seed-rate less than the formulæ rate—60 lbs. for sweet rice. The weight of straw in column 7 less than that of the grain, which is doubtful.
29¾ G.	55	*Experiment No. 50.* do. do. do.
3 G.	...	*Experiment No. 51.*—Sugarcane *támbi* or red on a *mâl* or reddish soil, grown once in ten years, rice being the yearly crop. The land is classed as garden and irrigated from a well. No special charges for water. Manured with ráb and cowdung burnt on the land and *haid* fish manure as a top-dressing. Cultivation good and season favourable. Weight of cane produce not given, but the gul yield estimated at 12 *as.* (4,000 lbs. the acre according to the formulæ for the táluka). Rate of seed not reported; about 3,500 canes are on an average required for planting in one acre of land (formulæ). Fuel, ordinary fire-wood, at Rs. 15 for an acre produce.
3¼ G.	47	*Experiment No. 52.*—Late *nágli* every year on a *kátalvat* or stony soil. Rábed in May and manured with *haid* fish manure in July. Cultivation good and season excellent for the varkas crops. Anna-valuation not reported, but the yield in column 6 indicates that the crop was not below average. Seed-rate in column 5 compared with the formulæ rate per acre (7 lbs.) for the táluka, high, but is reported to have been for the seed-bed sufficient for the transplanted area. One acre area of such seed-bed produces seedlings enough for 2 acres. Column 7 *nil* as the by-product was not taken but left for cattle to graze on. The figures are doubtful as the crop was weighed when moist. Price of nágli 32 sers per rupee in December 1886. The area less than the prescribed minimum for the dry-crop.
6 G.	40½	*Experiment No. 53.*—Sweet rice vágsál continually grown on *mâl jamin* or red soil. Rábed in May. Cultivation fair and rain timely. The crop though estimated at 16 *as.*—2,000 lbs. the acre—was below the 16-anna formulæ estimate, which is perhaps due to wetness of the crop when weighed. Seed-rate compared with the formulæ rate per acre,—60 lbs., high, but applies to the seed-bed and not to the transplanted area.
5½ G.	40½	*Experiment No. 54.*—Rice irrigated from a stream on an alluvial soil or *umbarset*, growing rice *náchni* and *pávta*. Rábed with 240 head-loads of manure consisting of brushwood and branches, dung, dry grass and earth in equal quantities. Cultivation good and the field had few weeds; and the season though favourable for the varkas crops injured rice with its heavy rain between June and August. Yield estimated at 12 *as.* Rate of seed 18 lbs. per acre for rice given in column 5 as reported, but compared with the formulæ rate low and partly due to pávta being sown among rice. Straw compared with grain high, but was weighed when wet. Incidence in column 10 calculated on rice alone. Column 6 represents the weight of wet grain, making allowance for dryage at about 24 per cent. Weight of contents of 1 local *ser* measure not taken by the experimenter but afterwards reported by the Collector at 40½ *tolás.*
8 G.	47	*Experiment No. 55.*—Vari on a hill side or *dongar* soil. Rotation—náchni, harik, and vari. Rábed with 77 head-loads of manure consisting in equal quantities of brushwood and grass mixed with half the quantity of cowdung. Cultivation good, and rain, though heavy for rice, favourable to vari and other varkas crops, but the crop experimented on was injured a fortnight before cutting by grub or *kid* and the yield per acre in local estimate 8 *as.*—350 lbs. according to the formulæ for the táluka. The grain was weighed when wet, but the column 6 represents the probable weight of the grain when sufficiently dry, deducting dryage at 20 per cent. By-product being useless as fodder, was not weighed and the incidence in column 10 on grain yield alone. As in the above experiment, the average weight of 1 measure *ser* of the crop experimented on reported by the Collector at 47 *tolás.*